JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF HEALTH SCIENCES

UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN

COMMUNITY DEVELOPMENT AND PUBLIC HEALTH

4TH YEAR 1ST SEMESTER 2019/2020 ACADEMIC YEAR

KISUMU CAMPUS

COURSE CODE: SBI 3415

COURSE TITLE: BIOSTATISTICS II

DATE: 13/08/2019   **EXAM SESSION: 2.00 – 4.00 PM**

TIME: 2 HOURS

<u>**Instructions:**</u>
1. **Answer all the questions in Section A and ANY other 2 questions in Section B.**
2. **Candidates are advised not to write on the question paper.**
3. **Candidates must hand in their answer booklets to the invigilator while in the examination room.**

SECTION A: Answer ALL questions in this section (30 marks)

1. Define inferential statistics (2 marks)

2. Differentiate between a statistic and a parameter. (2 marks)

3. Differentiate between a point and an interval estimate (2 marks)

4. Calculate the mean, median, mode, range, variance and Standard deviation in that order for the following set of observed temperatures among children visiting Kisumu West Sub-County Hospital with reported fever.

    36.7, 34.9, 35.8, 38.0, 36.8, 36.6, 36.7, 35.6, 39.2, 38.5, 36.2, 37.5 (10 marks)

5. From past experience, it is known that the number of anti- snake bite drugs purchased from a certain phamacy follows a distribution that has mean $\mu = 2.4$ and standard deviation $\sigma = 2.0$. Suppose that in a given month there are 100 residents standing in line to purchase the drugs. If only 250 doses remain, what is the probability that all the 100 residents in line will be able to purchase the drugs they desire? (4 marks)

6. A simple random sample of 10 people from a certain population has a mean age of 27. Can we conclude that the mean age of the population is not 30? The variance is known to be 20. Let $\square = 0.01$. (3 marks)

7. In a study of preeclampsia, Kemunto and Ocholla found the mean systolic blood pressure of 10 healthy, non-pregnant women to be 119 with a standard deviation of 2.1.
   (Preeclampsia: Development of hypertension, albuminuria, or edema between the 20th week of pregnancy and the first week postpartum.
   Eclampsia: Coma and/or convulsive seizures in the same time period, without other etiology.)

   Questions:
   a. What is the estimated standard error of the mean? (2 marks)

   b. Construct the 95% confidence interval for the mean of the population from which the 10 subjects may be presumed to be a random sample. (3 marks)

8. What is a hypothesis? State the two statistical errors that can be committed during hypothesis testing. (2 marks)

SECTION B: Answer any 2 Questions in this section (40 marks each)

1. The table below shows reasoning score, x, and epidemiology test score, y, for each of a random sample of 8 BSc. Public Health students.

Student	1	2	3	4	5	6	7	8
x	112	113	110	113	112	114	109	113
y	69	65	75	70	70	75	68	76

    a. Calculate the regression equation showing the relationship between the scores in reasoning and epidemiology.   (15 marks)

    b. Calculate the correlation coefficient.   (5 marks)

2.

  a. Suppose that you have a sample of 100 values from a population with mean $\mu=500$ and with standard deviation $\sigma = 80$.

      i. What is the probability that the sample mean will be in the interval (490, 510)?

               (5 marks)

      ii. Give an interval that covers the middle 95% of the distribution of the sample mean.

               (5 marks)

  b. A randomized trial was done with two groups of diabetic patients to evaluate the effectiveness of control of blood sugar using two drugs A and B. Glycated hemoglobin (HbA) was used as a measure of control of blood sugar.

Group 1 Patient	HbA Drug A	Group 2 Patient	HbA Drug B
1	5	1	7.5
2	7	2	7
3	8	3	6
4	9	4	6
5	10	5	5
6	9	6	4.5
7	6.5	7	4
8	8.5	8	7
9	10	9	6
10	10	10	7.5
11	8	11	9
12	9.5	12	10

    Investigate if the reasearcher is right to assume that drug B is better than drug A in control of blood sugar. *Note: a smaller HbA value indicates better control of blood sugar.*

(10 marks)

3.

a. List three key assumptions in the Analysis of variance. (3 marks)

b. 22 bypass patients are randomly divided into 3 treatment groups (different respiration) and the values of folic acid in their red blood cells are recorded after 24 hours, see the data below. Use the correct statistical test to determine whether there was a difference in the mean folic acid values between the three groups. (17 marks)

Group 1	243	251	275	291	347	354	380	392	
Group 2	206	210	226	249	255	273	285	295	309
Group 3	241	258	270	293	328				

4.

a. The weight (kgs) distribution of 18 patients randomly selected from the university dispensary is as follows;
62, 39, 58, 87, 96, 58, 59, 49, 65, 120, 70, 85, 79, 68, 63, 91, 80, 78

   i. Calculate the mean, median and range (4 marks)

   ii. Construct the 95% confidence interval around the mean $\bar{x}$ (6 marks)

b. A case-control study was done to investigate whether high salt intake among men aged 50-54 years leads to higher cadiovascular disease (CVD) deaths. Of the 35 people who died from CVD (cases), 27 were on high-salt diet before they died, whereas of the 12 who died from other causes (controls), 5 were on such a diet.

   i. Display the data in form of contigency table (1 mark)

   ii. State the suitable hypothesis (1 mark)

   iii. Determine whether there is any association between high salt diet and death from cadiovascular disease. (8 marks)